

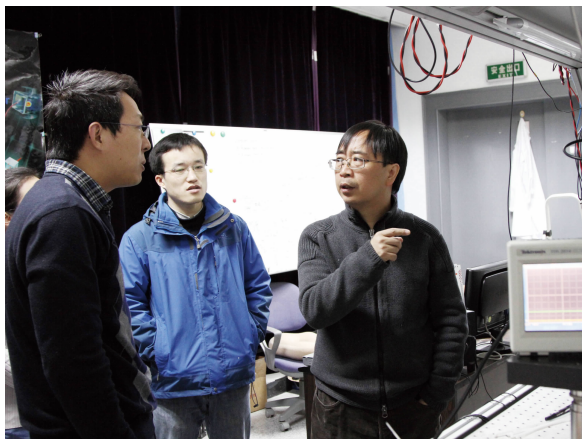
PART III

Introduction on Selected PIs of the Science Fund for Creative Research Groups

3.1

Dr. Pan Jianwei

Professor of physics
University of Science and Technology of China
PI of the Creative Research Group in 2012



Dr. Pan Jianwei is a full professor of physics at the University of Science and Technology of China, a member of the Chinese Academy of Sciences (CAS) and the Academy of Sciences for the Developing World, one of the first awardees of the Thousand Talents Program of China, the Chief Scientist for the Quantum Science Satellite belonging to CAS Strategic Priority Research Program in Space Science, an awardee of the 2012 International Quantum Communication Award from the International Organization for Quantum Communication, Measurement and Computing.

Along with the development of quantum information science with the presence of interdisciplinary characteristics, the NSFC-funded Creative Research Group titled by “Quantum Information Physics and Technology Based on Photons and Cold Atoms” focuses its research on some of the key problems in the quantum frontier area, aims at fully promoting researcher’s academic and technical specialty, motivating long-term and close cooperation, and growing in research capacity under sponsorships from various scientific funds. The team’s research covers the fundamental theory of quantum physics and quantum information, the entanglement manipulation of multi-photon, practical quantum key distribution, quantum experiments at space

scale, the quantum control of cold atoms, as well as high performance quantum equipment etc. This group includes sixteen full professors, ten associate professors, as well as postdoctoral researchers and graduate students. Among the key team members, there are two Yangtze Chair Professors of Physics awarded by the Ministry of Education, three awardees of the National Science Fund for Distinguished Young Scholars of NSFC, eight awardees for the Hundred Talents Program from the Chinese Academy of Sciences, three awardees for the Yong Thousand Talents Program of China, one awardee for the Chen Jiageng Award for Yong Scientists. The team members have published more than 90 papers in high-profile journals, which includes 13 papers in *Nature*, 10 papers in *Nature Physics*, 5 papers in *Nature Photonics*, 2 papers in *PNAS*, and 64 papers in *Physical Review Letters*. The results are recognized as the best of 2004, 2008 from the Institute of Physics in Europe, the Top Physics Stories of 2004, 2006 from the American Institute of Physics, the Technology Research Advances of 2004 by MIT, the 2003, 2004, 2006, 2007, 2008, 2010 Annual Top Ten Scientific and Technological Highlights in China by academicians of CAS and the Chinese Academy of Engineering (CAE), the 2003, 2004, 2007 Top Ten Science and Technology Progress in China’s Higher Education, the 2006, 2007, 2010 Annual Top Ten News for Fundamental Research in China. The research team is conducting a series of research projects for tackling key problems aiming at the realization of wide area quantum communication, scalable quantum computing and quantum simulation, promising a number of innovative scientific results at a world leading level. The whole team is developing high-level quantum apparatus with independent intellectual rights, as well as boosting engineering and commercialization for ripe products.

3.2

Dr. Li Anmin

Professor

Sichuan University

PI of the Creative Research Group in 2012



Prof. Li Anmin, is an academic leader of the Yangtze River Mathematical Center of Sichuan University, a "Yangtze River Scholar" appointed by the Ministry of education, and was elected as the member of Chinese Academy of Sciences in 2009. He is in major of differential geometry and symplectic topology, published more than 40 papers on international renowned journals and two books. His works has been widely acknowledged and has important impacts in his research field. Prof. Li has been granted with many projects such as Key Program of NSFC, the Doctoral Training Program of the Ministry of Education, the National Basic Research Program of MOST, and etc. He serves as an editor of "*Acta Mathematica Sinica*" (Chinese/English version) and of "*Results in Math*". He has achieved many awards including the third class prize of the National Natural Sciences Award (1994), the first class prize of the Science and Technological Progress Award of the State Educational

Commission (1988), Hongkong Qiushi Fund for Outstanding Young Scholar Award (1995), the first class prize of the Natural Science Award of the Ministry of Education (2006) and etc. In the past more than one decade, based on the trend of international research and the specialty of the research group, the group has been focusing its study on the moduli spaces in geometric topology as their long-term research plan. With this goal, they have made a solid step in attracting young mathematicians of the field to the group, in particular, since the Yangtze River Mathematical Center was founded at 2004 under the supervision of chief Professors Liu Yingming and Ruan Yongbin, young experts were recruited from MIT, SUNY Stnybrook, Princeton IAS, University of Michigan, and Mainz University and etc. Today, the research group has accumulated a group of prestigious scholars and become a competitive team in the field. In 2012, the research group was granted with the Science Fund for Creative Research Group of NSFC. The group consists of 2 CAS members, 4 awardees of The National Science Fund for Distinguished Young Scholars of NSFC, 2 Yangtze River scholars, 5 awardees of the Trans/New Century Excellent Talents Program of the Ministry of Education and several young mathematicians with great potentials. They will take full advantages of their expertise in geometry, topology and algebra, and conduct on the study of topology and differential structures on moduli spaces, the invariants and related theories. The group expects to achieve a series of results with originality, develop some new theories and methods in studying moduli space, and become a research ream with important international academic impacts.

3.3

Dr. Tan Weihong

Professor
Hunan Univeristy
PI of the Creative Research Group in 2012



The team leader of this innovative research group is Prof. Weihong Tan at Hunan Univeristy, who is also the director of the State Key Laboratory of Chemo/Biosensing and Chemometrics. He is an awardee of the National Science Fund for Distinguished Young Scholars, a principal investigator of the National Basic Research Program of China, a winner of the China Recruitment Program of Global Experts and a distinguished professor of the Cheung Kong Scholars Program. Prof. Tan is well recognized for his work in the areas of bioanalysis, chemical biology, bionanotechnology and biomedical engineering. He has published over 340 papers on major journals such as *Science*, *PNAS*, *Acc. Chem. Res.*, *J. Am. Chem. Soc.* and *Angew. Chem. Int. Ed.* with an H-index of 71 and more than 16,300 citations.

This team started its research work of chemosensors since 1970s, led by Prof. Ruqin Yu and Prof. Shouzhao Yao. With much effort to boost talent training and research capability in more than 40 years, the team has become an innovative research group with its research targets focusing on the key scientific and technologic problems in chemistry, biology, medicine, pharmacy, environmental science and food industry. In 2008, it was selected as an innovative research team in Program for Yangtze River Scholars and Innovative Research Team in University. The group consists of two members of the Chinese Academy of Sciences, four awardees of the National Science Fund for Distinguished Young Schol-

ars, one winner of the China Recruitment Program of Global Experts, two distinguished Professors of Yangtze River Scholars Program and six Professors selected in New Century Excellent Talents in University.

Based on the State Key Laboratory of Chemo/Biosensing and Chemometrics, the group carries out theoretical and applied research on six primary research areas, including molecular recognition and molecular probes, chemical and biological sensing, bionanotechnology and bioimaging, chemometrics, biochemically analytical instrumentation, bioanalysis and molecular biology. In the past ten years, the group has received more than 300 funding projects such as the National Basic Research Program of China (973 program), Major/Key Programs of the Natural Science Foundation of China and National Science Fund for Distinguished Young Scholars, published more than 1000 SCI articles, and authorized more than 30 national invention patents. The group has also won two second class prizes of the National Natural Science Award (2003, 2011), two first class prizes of the Natural Science Award of the Ministry of Education (2008, 2011), and one first class prize of the Natural Science Award of Hunan Province (2010).

Focusing on the biological basis of human health and disease, the group will continue to carry out creative basic research and technical exploration thoroughly and systematically with new methods, new instruments, and new materials in the field of chemo/biosensing, to develop quick, highly sensitive and selective, high-throughput molecular detecting and biosensing techniques. In the near future, the group will develop nucleic acid or peptide aptamer-based novel analytical techniques and methods for detection of biomarkers of major diseases with high sensitivity and accuracy, provide techniques and methods for solving the national key scientific and technologic problems in the diagnosis and therapy for major diseases, and for the research and development of modern Chinese medicine, food safety and biosecurity.

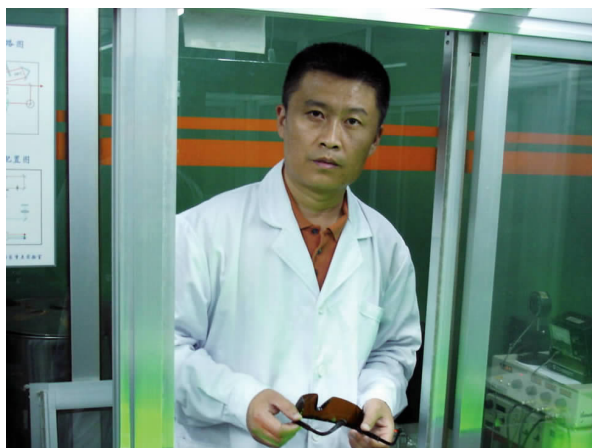
3.4

Dr. Fu Hongbing

Professor

Institute of Chemistry, CAS

PI of the Creative Research Group in 2012



Prof. Fu Hongbing is the chief scientist of the National Basic Research Program of China, the winner of the National Science Fund for Distinguished Young Scholars, and the grantee of the 100 Talents' Program of the Chinese Academy of Sciences (CAS). His research focuses on low-dimensional nanomaterials of organic semiconductors for potential electronic and photonic applications, such as field-effect transistors, photovoltaics, nanolasers and bio-sensors.

The Creative Research Group (CRG) of photo-functional materials led by Prof. Fu is comprised of 8 research professors, including Prof. Yao Jiannian and Prof. Zhao Jincai, who both are members of CAS. This CRG was formed based on the CAS Key Laboratory of Photochemistry, with the aim of exploring the structure-property relationship of photo-functional materials from molecular level to supramolecular level at nanoscale. Through the design and synthesis of a variety of building blocks, which are also capable of self-assembly in a well-controlled way, a myriad of nanomaterials had been fabricated for developing high-performance organic electronic and photonic devices as well as visible-light semiconductor photocatalyst.

Organic semiconductors are fundamentally different from those inorganic counterparts as a result of the

weak intermolecular interaction forces of van der Waals type and the highly localized Frenkel excitons in these materials. The group initiated the investigation on the size dependent properties of organic nanomaterials made from small molecules at the beginning of this century. Especially, they discovered the charge-transfer exciton confinement effect and size-tunable absorption and emission properties of organic nanoparticles. Their studies on organic nanoparticles demonstrated that not only can the wide panel of physical properties provided by organic compounds be fully exploited, but the properties can also be modulated by the particle size and morphology. These results extended the research on nanomaterials from metal and inorganic semiconductors to the organic compounds and showed the different size-dependent characteristics of organic nanostructures. Furthermore, the research had made significant contributions to rationally designed smart organic nanomaterials through tuning the geometry of the constituent molecules. The group investigated the interactions that affect the way molecular components aggregate into particularly shaped nanostructures. Recently, the team developed several general methods to control the self-assembling growth kinetics of organic nanostructures. These efforts open effective strategies for constructing organic nanostructures with well-controlled sizes, shapes and therefore functions, making them a novel class of nanomaterials attracting world-wide research interest.

The group is one of the first few groups, who put emphasis on organic one-dimensional (1D) nanostructures. They synthesized single-crystalline organic nanowires. Based on the study of the optical confinement effect in organic nanowires, the group realized nanowire white-light sources, optical waveguides, nanolasers, photodetectors, as well as nanowire heterostructure optical routers and heterojunction solar cells, which form a tool box for the development of organic nanowire photonics with potential for use in high-speed data highways on

electronic chips. The results verified that organic semiconductor nanowires can be workhorses of nanoscale-optoelectronics because of the great tunability of their molecular and electronic structures and their crystal structures. Moreover, they found that strong optical confinement in organic nanowires results in coupling of Frenkel excitons with high binding energy and oscillator strength with nanowire cavity photons, generating a new eigenstate, namely, exciton polaritons (EPs), which are half-light half-matter bosonic quasi-particles. In comparison with uncoupled light, organic EPs show remarkable propagation properties, such as anomalously low group velocity, providing a new platform for studying the light-matter interaction. For example, The CRG demon-

strated for the first time that new quantum effects can be brought by the coupling of EP with surface Plasmon polariton (SPP) at organic/metal interfaces, which can help to solve the difficult problems resulted from optical losses in integrated nanophotonics.

The CRG of photo-functional materials has published more than 260 papers in scientific journals, including *Science* (1), *Acc. Chem. Res.* (3), *Chem. Soc. Rev.* (2), *Nature Chem.* (1), *J. Am. Chem. Soc.* (24), *Angew. Chem. Int. Ed.* (14), *Adv. Mater.* (11), in recent five years. The publications have been cited more than 16,000 times.

3.5

Dr. Zhan Renbin

Professor

Nanjing Institute of Geology and Palaeontology, CAS

PI of the Creative Research Group in 2012



Prof. Zhan Renbin, the Nanjing Institute of Geology and Palaeontology (NIGP), Chinese Academy of Sciences (CAS), and the academic leader of an creative Research Group under the auspices of the National Natural Science Foundation of China (NSFC) since 2012, received the National Science Fund for Distinguished Young Scholars in 2008, and is now the secretary and voting member of the International Subcommittee on Silurian Stratigraphy.

This Creative Research Group, pioneered by such well-known paleontologists and stratigraphers as Lu Yanhao, Wang Yu and Mu Enzhi, has conducted a series of stratigraphical and paleontological investigations and made a great contribution to the national and international Lower Paleozoic research. Currently, it has two CAS members, Rong Jiayu and Chen Xu, several middle-aged and young researchers active on the international academic community such as Zhan Renbin, Li Jun, Wang Yi, Zhang Yuandong, Fan Junxuan, Zhu Xuejian, Tang Peng, Huang Bing, Yan Kui and Wu Rongchang, and up to 20 graduate students and post-doctoral fellows with specializations in different fossil groups as well as sedimentology and geochemistry.

In conducting a number of large-scale projects, ranging

from Petroleum Exploration Campaign in Southwest China in the 1960s and 1970s, the Joint Investigation on Silurian Geology between China and the United Kingdom in 1980s and 1990s, to several major basic and applied research projects in past decade, this group was always pursuing team work and tackle key problems through collaboration and has organized many joint field investigations including experts on variable fossils groups and other subjects. Through individual laboratory research and multidisciplinary discussions, the Group has obtained many important results on some of the key scientific problems related to the macroevolution of major organisms and the evolution of ecosystem during the Early Paleozoic. In the past 10 years, members of this Group lead two projects of the National Basic Research Program from MOST, one project of the Major Program and one project of the Key Program from NSFC respectively, four major innovative projects from CAS, one pioneer basic research project from the SinoPec, and many other research projects from various funding sources. It successfully organized two international Cambrian symposia, one Ordovician and Silurian, and one annual meeting for IGCP 410 and 503, respectively.

During the past five years, the Group made a series of achievements in systematic paleontology, high-resolution stratigraphy, Ordovician radiation, end-Ordovician mass extinction and the recovery and re-radiation aftermath. Its members have also closely cooperated with colleagues from other universities and companies and made substantial contributions to the investigation on national strategic resources, particularly oil and gas. As a result of its world-class leading edge research, the Group obtained the first Golden Spike within the Ordovician System (the GSSP of the Darriwilian Stage) in 1997, which was also the first Golden Spike in China. It gained another Golden Spike (the GSSP of the Hirnantian Stage, topmost Ordovician) in 2007, in the meantime two Golden Spikes within the Cambrian System were obtained by the members of this Group, making it

the only research group in the world that has successfully defined four GSSPs. Members of the group have published 228 papers and five monographs, and edited two books of paper collections during the past five years. Some members of the group have received prestigious national awards, such as the National Natural Science Award, the Jiangsu Science Progress Award, the He-Liang-He-Li Award, and the Li Siguang Geological Science and Technology Award.

To further develop its research and to strengthen its re-

search team in the following five years and beyond, the group will focus its study on two major biotic events in the Early Paleozoic, i.e., the Great Ordovician Biodiversification Event (GOBE) and end-Ordovician mass extinction and the recovery and re-radiation afterwards. Besides traditional systematic paleontology and biostratigraphy, sedimentology and geochemistry will be emphasized to further investigate the timing, mode and pattern of these two bio-events and their dynamics.

3.6

Dr. Zhao Meixun

Professor

Ocean University of China

PI of the Creative Research Group in 2012



Prof. Zhao's research is focused on marine organic geochemistry, including the evolution and processes of marine ecological system, marine carbon cycle, and stable isotope geochemistry. He is a panel member of the review committee in the Department of Earth Sciences of NSFC, an editorial member of *Science China (Geosciences)*, an associate editor of *Journal of Ocean University of China* (English edition, SCI-E), a guest editor of *Palaeogeograph Palaeoclimatol Palaeoecol*. Prof. Zhao currently is PIs of many national programs including "Evolution Processes, Mechanisms and Future Trends of China's Shelf Sea Environments and Ecosystems", National Basic Research Program of China. He published more than 80 papers, including 3 in *Nature*, which were cited for more than 1000 times.

For the organic carbon cycle of China marginal seas, Prof. Zhao's research established the spatial-temporal distribution and control mechanism of the content and variation of ratio of biomarkers in China marginal seawater and surface sediments, developed and validated several proxies for ecological environment and organic matter sources' reconstruction; calibrated indexes like BIT, compound-specific C13 and C14 for distinguishing the organic matter sources in China marginal seas; provided preliminary evidence for the effectiveness of the

multi-parameters biomarkers on revealing climate change and human activity's influence on marine environment, which indicated that the combination of human activity and climate change resulted in the rise of the burial organic matter and percentage of marine-originated organic matter, as well as the enhanced effectiveness of the carbon sink in East China Sea and Yellow Sea in the past half century.

Prof. Liu Sumei, a co-PI, and other members in the group quantified the bury and regeneration of the nutrient sources in coastal sediments, broadened people's knowledge on coastal eutrophication. She was invited to be the co-author for a review paper about the relative contents in *Science*. Prof. Guipeng Yang, also a co-PI, focused his study on the conversion and degradation of organic matter by using typical small organic compound such DMS to establish a biogeochemistry cycle model, which is used as an important platform for calculating precisely the sea-to-air fluxes of DMS and evaluating the influence of DMS's emission on global climate change.

In the future research, the group plans to study the key processes controlling marine organic matter sources, from land nutrient input to primary productivity and ecosystem structure utilizing both modern surveys and historical data; to clarify the conversion and degradation processes of the typical marine organic matter by focusing on the conversion and degradation level of the organic matter and temporal and spatial variation and physical, chemical and biological factors that can influence on organic matter's conversion and degradation; to understand climate change and human activity's influence on sedimentary organic carbon sink in marginal seas by focusing on the distinction and estimation of the source and amount of the sedimentary organic carbon in marginal seas and the burial record of the sedimentary organic matter in marginal seas. By studying on the scientific questions listed above, the group aims to train several young researchers with high academic standards.

3.7

Dr. Li Hejun

Professor

Northwestern Polytechnical University

PI of the Creative Research Group in 2012



Prof. Li Hejun is the winner of the National Science Fund for Distinguished Young Scholars in 2002, the National Model Teacher and the “Sanqin” Scholar of Shaanxi province. He is the dean of the school of Materials Science and Engineering in Northwestern Polytechnical University, the vice director of the State Key Laboratory of Thermostructural Composite Materials, and the director of the Shaanxi Provincial Engineering Research Center of Carbon/carbon Composites.

Ultra-high temperature composites are a kind of strategic materials, which are indispensable in advanced vehicle applications of aeronautics and astronautics. In the late 1980s and early 1990s, Prof. Zhang Litong, member of CAS and Professor Yang Zheng in Northwestern Polytechnical University returned from the United States as visiting scholars, they began to engage in the research of ultra-high temperature composites, according to the international development trend of these composites and the urgent needs of aeronautics, astronautics and defense in the country. In 2000, the first laboratory of ultra-high temperature composites in China was founded under the leadership of Prof. Zhang Litong. During the establishment of the lab, Professor Li Hejun gave a lot of as-

sistances. In 2006 and 2008, the research group was selected as Changjiang Scholars Innovative Research Group supported by the Ministry of Education and the National Defense Science and Technology Innovation Group. The research group for the physico-chemical process of preparation and service of ultra-high temperature composites in applications of aeronautic and astronautic applications is headed by Professor Li Hejun and guided by Prof. Zhang Litong, who is the member of CAS and the founder for this research discipline. The group is composed of 3 awardees of the National Science Fund for Distinguished Young Scholars of NSFC, 2 awardees of the Thousands Talent Program, 3 awardees of the New Century Excellent Talents Program of the Ministry of Education, 2 winners of the National Excellent Doctoral Dissertation and a number of potential young academic leaders.

In order to meet national great strategic demand, the group has formed the sustainable model for the chain from basic research, pre-research and application, and became the national research group in the field of ultra-high temperature composites after more than 20 year efforts. The group has accomplished more than 180 research projects, including 5 projects of the Key Program, 36 projects of the General Program including the Young Scientists Fund of the National Natural Science Foundation of China, 4 projects of the National Basic Research Program in defense and in civil area. The total funding of abovementioned projects is nearly 218 million RMB. In addition, the group has received numerous awards, including one first class prize and one second class prize of the National Technological Invention Award, 6 first class prizes and 12 second class prizes of the Provincial Science and Technology Award, and has applied for more than 90 invention patents (more than 70 patents authorized). During the recent 5 years, the group has published more than 500 related papers (more than 400 papers cited by

SCI), and published 51 papers in the prestigious journal like *Carbon* (impact factor is 5.378), cited by others for more than 3000 times. The successful applications of research achievements in the field of aeronautics, astronautics and defense, has provided a vital support of new materials for the development of defense and equipment in China.

The future work of the group will focus on the physico-chemical process and microstructure control for precursor conversion of carbon and ceramic, the damage failure mechanisms and property prediction

for ultra-high temperature composites, the theory and failure mechanism of anti-oxidation and anti-ablation coatings, the computer simulation of preparation, service process and properties. A major breakthrough is expected in the microstructure design and control of ultra-high temperature composites, as well as the service failure theory. The expected results can support the innovation and applications of these composites. This group is expected to be the outstanding international research group of ultra-high temperature composites.

3.8

Dr. Gao Deli

Professor

China University of Petroleum (Beijing)

PI of the Creative Research Group in 2012



Specialized in the well engineering for oil & gas, Dr. Gao Deli is a distinguished professor of the Cheung–Kong Scholars Program of the Ministry of Education in 2001 and in charge of the national key discipline of petroleum engineering (the nationwide rank No.1) at China University of Petroleum. As the academic leader, he has long been in charge of the key discipline development and the construction project of the innovation research base for superiority discipline, which were financially supported by the National Program for the Development of University of the Ministry of Education, and kept the leading position of petroleum engineering discipline in China.

Through implementing projects of the Key Program of NSFC and other national major projects hosted by Dr. Gao, the research group has been naturally developed and shaped for basic research on drilling & completion of critical wells for oil & gas, which is aiming at the frontier of petroleum engineering discipline development for the major demands of the national oil & gas exploration & exploitation. This group was early selected as one of the first batch innovative research teams by the Ministry of Education of China in 2004 and also selected as one of the creative research groups by the National Natural Science Foundation of China in 2012. Now, the group is composed of three winners of the National Science Fund for Distinguished Young Scholars, 2 awardees of the Cheung–Kong Scholars–endowed professors and

several potential young academic leaders.

Since 2003, the research group led by Dr. Gao has been granted with some important projects, such as 3 Key Program projects, 1 International Cooperation Program project, 22 General Program projects of the National Natural Science Foundation of China, and two projects supported respectively by the National Basic Research Program and the National Major Special Plan for Science & Technology. Also, some technical research projects supported by the petroleum enterprises have been completed by this research group, which promote effectively the development of the research group and the growth of the academic leader.

This group has long been committed to the basic research on drilling & completion for oil & gas. From 2005 to 2012, in the aspects of the formation evaluation, drilling mechanics & down–hole control, protection & stimulation of oil reservoir, the research group has already obtained 39 inventive patents and published 12 books and technical papers in which there are over 380 papers indexed by SCI & EI, and won 12 items of the national prizes for science & technology, which indicate that the group has obvious characteristics and dominant position in oil & gas well engineering and has won good peer evaluation inland and abroad. Also, Dr. Gao was one of two winners of the Energy Prize issued by the Sun Yueqi Scientific and Technological Education Fund in 1992, and one of 100 distinguished youth scientists receiving the China Youth Science and Technology Prize in 1994, and one of winners of the National Achievement Award of Returned Overseas Chinese Talents in 2003.

In the next 3 years, according to the background of drilling & completion, for effective exploration & exploitation of the residual oil & gas resources such as deep, deepwater and unconventional, the research group will continue to explore the drilling characteristics of the formation, reveal the mechanism of downhole process instability, find new ways for downhole control of safe and efficient drilling, so that the scientific basis will be laid to break through the technical bottleneck in critical well engineering. Thus, three research priorities are proposed as: (a) formation evaluation for drilling & completion; (b) down–hole mechanics and control engineering; (c) drilling fluid & completion fluid for critical well engineering.

3.9

Dr. You Xiaohu

Professor

Southeast University

PI of the Creative Research Group in 2012



Professor You Xiaohu currently is the dean of the School of Information Science and Engineering, Southeast University, the Director of National Mobile Communications Research Laboratory, Chair of IEEE Nanjing Section and Associate Editor-in-Chief of *Science China Information Sciences*. He was selected as IEEE Fellow in 2011. He won the professorship of the Cheung Kong Scholars Program in 2002 and was the recipient of the National Young and Middle-Aged Experts with Outstanding Contributions, the Trans-Century Young Scholars by the Ministry of Education, and the National May Day Labour Medal. He took the position of the Chief Expert of the major project on Broadband Networks of the National High Tech R&D Program of China from 2002 to 2006. From 2006, he is the Deputy Chief Engineer of Broadband Mobile Communications of the National Science and Technology Major Project and won the second class prize of the National S&T Advance Award (ranking first) in 2003 and the first class prize of the National Technology Invention Award (ranking first) in 2011.

The future mobile communication systems should be capable of supporting the application of high definition video system and other broadband multimedia service. Under the support of the Major Program of the National Natural Science Foundation of China and other projects, Prof. You and his group have engaged in the research of fundamental theory and technology devel-

opment of mobile communications, and have made important progress in distributed radio networking, broadband multi-carrier multiple access, unifying MIMO, capacity-approaching and cooperative transmission. Some important achievements are as following:

1. The distributed mobile communication network architecture has been proposed and its significant advantage of spectrum efficiency and power efficiency has been theoretically verified, thus laying theoretical basis for the future green broadband wireless network.

2. A new-type broadband multi-carrier multiple access transmission technique named generalized multi-carrier (GMC) was proposed together with channel and frequency offset estimation and timing synchronization, which is best suited for asynchronized applications of broadband mobile communications.

3. A channel-adaptive unifying MIMO transmission has been developed, which is suitable to various MIMO environments with lower complexity.

4. A cooperative detector and decoder work mechanism is revealed, and a dual-turbo iterative detection and decoding theoretical method is proposed, thus solving such application difficulties as high complexity and large delay in the iterative receiver techniques for broadband MIMO wireless communication environment.

5. Innovative research achievements in cooperative transmission capability analysis and optimum transmission method have been obtained, a node-cooperative transmission method is proposed, which can eliminate the bottleneck of the channel information exchanges, hence the efficient cooperative transmission.

6. A joint resource allocation and interference management method is proposed for the distributed cooperative and self-organizing network. The system performance is self-optimized and operation efficiency is promoted under the situation of unbalanced QoS needs and service distribution.

In recent five years, this research group has published more than 500 papers, including 102 IEEE journal papers, 190 SCI papers and 390 EI papers; obtained 55 granted patents, submitted 50 proposals to domestic and international standardization organizations, and won the IEEE 2011 Stephen O Rice Prize Paper Award in the field of communications theory.

3.10

Dr. Chen Xiaohong

Professor

Central South University

PI of the Creative Research Group in 2012



Professor Chen holds many academic and research positions. She is the committee member of Business Administration Discipline Assessment Group of Degree Committee of State Council, committee member of the National Master of Business Administration (MBA) Supervisory Committee, and a member of the Social Science Committee of the Ministry of Education. She is the winner of the National Excellent Teachers, Awards for Young Teachers of Universities and the National Excellent Young Teachers (research-based field) under the Fok Ying-Tong Education Foundation. As academic leader of the national key discipline of management science & engineering at Central South University, Professor Chen has been leading the team engaged in the research on decision theory, approach and platform, SMEs, two-oriented society (resource-saving and environment-friendly society) and other areas. Her research has produced significant impact on both domestic and international academic circles.

The research group led by Professor Chen has been pursuing to solve major national and regional economic decision making problems and corporate practical decision making problems, To do research focusing both on basic and empirical research, aiming at reaching the international research front and meeting the

grandiose needs of the country, the group has undertaken various research projects, including Major International Joint Research Program, Major Program, Key Program and the National Science Fund for Distinguished Young Scholars of the National Natural Science Foundation of China and the National Major Research Program during the 9th to 11th Five Year Plans, and projects from the National Social Science Fund, etc. The group was selected as the Cheung Kong Scholars and Innovative Research Team of the Ministry of Education in 2007, and the Creative Research Group of National Natural Science Fund in 2009. The research group is composed of two awardees of the National Science Fund for Distinguished Young Scholar, 9 awardees of the Trans-Century Outstanding Talents Program of the Ministry of Education, and a number of young academic leaders with great potential.

In the context of complex economic environment, the research group led by Professor Chen focuses its study on decision-making problems involved in "Two-Oriented Society" and ecological civilization construction, protection of mineral resources, financing and growth of SMEs. The group has achieved series of innovative research results in the area of decision making behavior, theory and methods in complex large groups, uncertain decision-making methods and applications, decision-making platform development, and modeling and analysis of complex financial system. The main achievements were made including the development of the Smart Decision which is China's first decision-making application software platform with independent intellectual property rights. The group was awarded one second class prize of the National Science and Technology Progress Award, 15 prizes of the provincial and ministerial scientific awards, 1 second class prize of the National Teaching Achievement Award and 2 National Elaborate Courses. In recent three years, the research group has got 15 Computer

Software Copyright Registration Certificates, 6 National Invention Patents and published more than 230 research papers on prestigious academic journals such as *Marketing Science*, *DSS*, *EJOR*, etc., with 78 papers listed in SCI and SSCI database, and 15 monographs published.

The group has been giving special attentions to use research findings for the community. The group is the first to propose and to build up a "two-oriented society" standard system for the construction of "two-oriented society", and furthermore, has provided a series of reform and policy suggestions which have been highly appreciated by the government. The articles written by Professor Chen entitled "Scientific Building" Two-Oriented Society "Standard System", and Using institutional reform and innovation to promote the construction of "two-oriented society" have

been published as theoretical headlines in the "People's Daily". Other related research results have been widely applied in more than a dozen companies and government agencies nationwide, achieving economic benefits of more than 1.1 billion Yuan, and having strongly supported the construction of "two-oriented society" in national comprehensive reform pilot area of "Chang-Zhu-Tan" (Changsha-Zhuzhou-Xiangtan) city cluster.

The Innovative Research Group will focus on the following three research areas in next phase of development: (1) Innovative decision makings in two-oriented society, ecological civilization construction and green, recycling, low-carbon development; (2) Behavioral aspects of decision-makings; (3) Decision-making issues of SMEs financing and management, and their applications.

3.11

Dr. Lu Lin

Professor

Peking University

PI of the Creative Research Group in 2012



Prof. Lu Lin is the Councilor of the American Society of Neuroimmune Pharmacology, Chairman of the Chinese Society of Drug Abuse and Dependence, and Vice President of the International Chinese Association of Psychiatry. He is the Editor-in-Chief of the Chinese Journal of *Drug Dependence*, an Associate Editor of *Drug and Alcohol Dependence*, an Editor of *PLoS One*, and an editorial board member of the *International Journal of Mental Health & Addiction* and *American Journal of Drug and Alcohol Abuse*. Furthermore, he has been a reviewer for over 30 international journals, including *Science*, *Nature Medicine*, *Nature Neuroscience*, and *Journal of Neuroscience*.

The function of the nervous system establishes the foundation for human vital movement. The central nervous system maintains homeostatic plasticity between excitement and inhibition through dynamic feedback regulation over complex external and internal information from multiple levels, including the networks of genes and signaling molecules, synapses, and neural circuits. In this process, the abnormal transmission of any neural signal will disrupt homeostatic plasticity, thus leading to dysfunction of the nervous system. In recent years, the Creative Research Group at Peking University, with Prof. Lu as the academic

leader and Prof. Zhang Dai, Prof. Wang Kewei, Prof. Wang Yun, Prof. Shi Jie, and Prof. You Wan as principal investigators, has performed in-depth and systematic research on the pathogenesis and clinical mechanisms of psychiatric disorders, such as drug dependence, depression, schizophrenia, and autism, at genetic, molecular, signaling pathway, and neural network levels of analysis.

The Creative Research Group led by Prof. Lu is an academic neuropsychiatric research group that was naturally formed during long-term collaborations to complete scientific research projects. Supported by the Peking University Health Science Center, the group combines elite researchers whose studies focus on the neural plasticity mechanisms of neuropsychiatric diseases, including two Cheung Kong Scholar professors, three winners of the National Science Fund for Distinguished Young Scholars, and several young academic leaders. During the past years, this research group has undertaken dozens of research projects, including the Major Program of the National Natural Science Foundation of China, National Basic Research Program (973 Program), National High-tech R&D Program (863 Program), National Key Technology R&D Program, and National Science and Technology Major Project, and has made several world-class breakthroughs in aspects of neural systems and neural plasticity associated with mental diseases. They have published over 200 high-level research articles in numerous renowned international academic journals in the fields of psychiatry and neuroscience, including *Science*, *Nature Genetics*, *Nature Neuroscience*, *Neuron*, *Trends in Neurosciences*, *Proceedings of the National Academy of Sciences USA*, *Molecular Psychiatry*, *American Journal of Psychiatry*, *Journal of Neuroscience*, *Biological Psychiatry*, and *Journal of Biological Chemistry*. These articles have been repeatedly cited in other journals, including *Nature*, *Science*, *Nature Reviews Neuroscience*, and

Neuron, nearly 4000 times in the past 5 years by international counterparts. More than 11 of these articles have been cited over 100 times individually, which has significantly influenced the neuropsychiatry field. Scientific achievements made by this group have won the first class prize of the Outstanding Achievement Award for Scientific Research in Higher Education Institutions (Natural Science Award, 2008), the second class prize of the Chinese Medical Science and Technology Award (2008), the second class prize of the Beijing Science and Technology Award (2008), the second class prize of the National Natural Science Award (2002), and the first class prize of the Chinese Medical Science and Technology Award (2001).

Psychiatric diseases, including drug dependence, depression, and schizophrenia, are vital problems that jeopardize human health. The neural plasticity mechanisms that underlie these diseases have been a research focus in the field of neuroscience. Based on previous work, the research group will investigate the neural plasticity mechanisms of psychiatric diseases from the perspectives of molecular signaling mechanisms, neuroelectrophysiology, neural circuits, and environment–gene regulation, aiming to make original and significant academic achievements in coming 3 to 5 years, attract and train new academic leaders, and form an internationally known innovative research group on neural plasticity.

3.12

Dr. Duan Shumin

Professor
Zhejiang University
PI of the Creative Research Group in 2012



Dr. Duan Shumin is a professor and the dean of the School of Medicine, Zhejiang University. He is an academician of Chinese Academy of Sciences, a member of the Academy of Sciences for the Developing World (TWAS), the president of Chinese Society for Neuroscience, and a council member of International Brain Research Organization. He serves as the Editor-in-Chief of *Neuroscience Bulletin*, the official journal of Chinese Society for Neuroscience, as well as an editorial board member in several international journals, including *J Neurophysiol*, *Glia*, *Neurobiol Disease*, *Hippocampus*, *Cell Calcium*, and *Plos One*. The team led by Professor Duan was selected as one of the Creative Research Groups of the Natural Science Foundation of China in 2012, with a research direction focusing on the molecular mechanisms of synapse and neural circuits in neuropsychiatric diseases.

The team focuses its research on synapse development, synaptic function and plasticity, and neuron -

glia interactions. In line with this research direction, the team members have made important contributions in these fields and published a number of high quality papers as corresponding authors in high profile journals such as *Science*, *Cell*, *Nature Cell Biology*, *Nature Neuroscience*, and *Neuron*. The team consists of the well-established scientists who are internationally renowned in the field of neuroscience, the young scientists who have done excellent work after they moved back to the country, and promising young scientists who have just come back to China. The team includes two awardees of the National Science Fund for Distinguished Young Scholars of the National Natural Science Foundation of China and four Scholars awarded with the Trans-Century Talent Training Program of the Ministry of Education.

In the next several years, the team will focus on the frontier of neuroscience and major demands of human health life in China, and aim at integrating basic neuroscience and the underlying mechanism of neuropsychiatric diseases. Through applying advanced theories and techniques in the fields of modern medicine, biology, and physics, the team will investigate intensively on the mechanism of synaptic development and function, elucidate regulatory mechanisms of balanced excitatory and inhibitory state of neural circuits, and further understand how dysfunctions in synapses and neural circuits correlate with the neuropsychiatric diseases. Take advantage of working as a team with outstanding capacity to innovate, the team will provide new insights on the diagnosis, drug targets, and the underlying mechanisms of neuropsychiatric diseases such as schizophrenia, autism, and epilepsy.

3.13

Dr. Zhang Xuemin

Professor

Academy of Military Medical Sciences, PLA

PI of the Creative Research Group in 2012



Professor Zhang Xuemin, an academican of the Chinese Academy of Sciences, chief scientist of the National Key Research Program, the director of the National Center of Biomedical Analysis of China, the deputy director of the State Key Laboratory of Proteomic and the member of editorial board of *J. Biol. Chem.*

Professor Zhang has been dedicating his research on cancer biology for many years, and made important achievements in the field of inflammation and tumorigenesis. He has published a number of papers in peer-reviewed high impact international journals, such as *Nature Immunology*, *Nature Medicine*, *Nature Cell Biology*, *J. Clin. Invest.*, *PNAS*, and the *EMBO J.* Professor Zhang has awarded with the National Natural Science Award, the Ho Leung Ho Lee Prize for Scientific and Technological Progress, the National Science Fund for Distinguished Young Scholars, and the Leader Talent Award of Science and Technology of PLA.

Recent data have shown that many cancers arise from infection and chronic inflammation. Although inflammation does not always cause cancers, inflammatory responses play pivotal roles at different stages of tumor progression, including initiation, promotion, invasion,

and metastasis. Clinical and epidemiological studies have suggested a strong association between inflammation and different types of cancer. However, the precise mechanistic linkage between inflammation and tumorigenesis are just beginning to be understood. To uncover the roles of key proteins and molecular events that governing the onset and progression of inflammation induced cancer would provide new insights into the origin and treatment of human cancers.

During last decade, Prof. Zhang and his group have been focusing their study on the mechanism of how inflammation contributes to tumorigenesis. Their major research interests includes immune regulator and signaling, dysregulation of inflammation and cancer, key factors in regulating cell cycle in cancer cells and the mechanism of DNA damage and apoptosis. By working at molecule, cell, animal and clinical level, Prof. Zhang found several key regulators including CUEDC2, Gankyrin, SOX4 and EIF5A and their roles in regulating inflammation and tumorigenesis. These findings extended our understanding of the close involvement of inflammation in tumorigenesis and the potential to manipulate this interaction to improve disease outcomes, which will facilitate the development of new and more effective cancer therapies.

Over 50 young scientists graduated from Prof. Zhang's lab, many of them are now the outstanding investigators in this group, including 3 winners of the National Science Fund for Distinguished Young Scholars, 2 winners of the China Science & Technology Youth Award, one was awarded with the National Best Paper Award for Doctoral Dissertation, 6 awardees of the Science and Technology Stars of PLA and Beijing Municipal Administration. The group was awarded the Science Fund for Creative Research Groups of NSFC in 2012.

Based on the advance of previous studies, the creative research group will focus on the mechanistic study of key regulators in inflammation induced cancers. By integrating views and methodology of molecule, cell, animal and translational medicine, aiming to understand and uncover mechanistic linkage between infection, autoimmune diseases and tumor, provide important theoretical basis, new targets and strategies for medical intervention for inflammation induced cancers.